REMARKS

Claims 1-3 are rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. Regarding claims 1 and 2, the Office Action states at page 2, paragraph 6, that merely measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing the DUT would not appear to be sufficient to constitute a tangible result, since the outcome of the measuring step has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized. Claims 1 and 2 are amended to recite measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing an operation of the DUT in at least one of a test procedure and a product test. Therefore, the measuring step is used to test an operation of the DUT in at least one of a test procedure and a product test, which is a tangible result.

Regarding claim 3, the Office Action states at page 2, paragraph 6, that merely measuring a boosting gain and a frequency response for testing the equalizing filter would not appear to be sufficient to constitute a tangible result. Claim 3 is amended to recite performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test. Therefore, the measuring step is used to test an operation of the equalizing filter in at least one of a test procedure and a product test, which is a tangible result. It is believed that claims 1-3 are amended in such a manner that the rejections of claims 1-3 are overcome. Accordingly, reconsideration of the rejections of claims 1-3 under 35 U.S.C. 101 is respectfully requested.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Furukawa, *et al.* (U.S. Patent Number 6,687,868). Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa, *et al.* in view of Behrens, *et al.* (U.S. Patent Number 5,903,857). Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Behrens, *et al.* in view of Chevalier, *et al.* (U.S. Publication Number 2004/0108953). Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Furukawa, *et al.* in view of Becker, *et al.* (U.S. Patent Number 5,929,628). Claim 6 is rejected under

35 U.S.C. 103(a) as being unpatentable over Furukawa, *et al.* in view of Becker, *et al.* and Behrens, *et al.* In view of the amendments to the claims and the following remarks, the rejections are respectfully traversed, and reconsideration of the rejections is requested.

In the present invention as claimed in claims 1 and 2, a filter characteristic measuring method includes generating an impulse signal, applying the impulse signal to a DUT having an analog filter through a digital channel, and, in response to the impulse signal, measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing an operation of the DUT in at least one of a test procedure and a product test.

In the present invention as claimed in claim 3, an analog filter characteristic method includes applying an impulse signal to an equalizing filter by using a digital channel of an automatic tester, and then obtaining an output response of the equalizing filterfilter and performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test.

In the present invention as claimed in claims 4-6, a system for measuring a characteristic of a filter in a DUT employing an analog filter includes a digital channel that provides an impulse signal without applying a sine wave to the analog filter of the DUT and a digitizer for receiving an output signal of the analog filter in response to the impulse signal so as to measure the characteristic of the filter.

Furukawa, *et al.* discloses a test device that includes a clock generator 101, a pattern generator 103, a digital pin electronic assembly 105, a digital analog synchronous circuit 107, an arbitrary waveform generator (AWG) 109, and analog pin electronic assembly 111 and a digitizer 113. The digital pin electronic assembly 105 supplies the digital signals of test patterns generated by the pattern generator 103 to predetermined digital pins of a DUT 100. The digital pin electronic assembly 105 receives output signals from the predetermined input digital pins DPIN of the DUT 100. The digital pins DPIN are connected to the logic circuit. The analog pin electronic assembly 111 includes signal lines and a plurality of switches SW. The analog signal generated by the AWG 109 is input to a predetermined input analog pin APIN of the DUT 100. The analog

signal output from a predetermined analog pin APIN of the DUT 100 is input to the digitizer 113. The digitizer 113 measures and analyzes frequency characteristics and group delays based on the analog signal output from the DUT 100.

Furukawa, *et al.* fails to teach or suggest a filter characteristic measuring method that includes generating an impulse signal and applying the impulse signal to a DUT having an analog filter through a digital channel and in response to the impulse signal, measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing an operation of the DUT in at least one of a test procedure and a product test, as claimed in claims 1 and 2. Instead, in Furukawa, *et al.*, the digitizer 113 measures and analyzes frequency characteristics and group delays based on the analog signal output from the DUT 100. The analog signal output from the DUT 100 is output in response to the analog signal input to the analog pin APIN of the DUT 100, rather than the digital signal input through the digital pin DPIN.

Furukawa, *et al.* fails to teach or suggest the elements of the invention set forth in claims 1 and 2. Therefore, it is believed that the claims are allowable over the cited reference, and reconsideration of the rejections of claim 1 under U.S.C. 102(e) as being anticipated by Furukawa, *et al.*, is respectfully requested.

Behrens, *et al.* is cited in the Office Action at page 4, section 7 as teaching that the analog filter is an equalizing filter. Like Furukawa, *et al.*, Behrens, *et al.* fails to teach or suggest a filter characteristic measuring method that includes generating an impulse signal and applying the impulse signal to a DUT having an analog filter through a digital channel and in response to the impulse signal, measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing an operation of the DUT in at least one of a test procedure and a product test, as claimed in claims 1 and 2.

Furukawa, *et al.* and Behrens, *et al.* fail to teach or suggest elements of the invention set forth in claims 1 and 2. Specifically, Furukawa, *et al.* and Behrens, *et al.* fail to teach or suggest a filter characteristic measuring method that includes generating an impulse signal and applying the impulse signal to a DUT having an analog filter through a digital channel and in response to the impulse signal, measuring a gain of the analog filter in the DUT and a frequency characteristic by using an output of the analog filter for testing an operation of the DUT in at least one of a test procedure and a product

test, as claimed in claims 1 and 2. Accordingly, there is no combination of the references which would provide such teaching or suggestion. Neither of the references, taken alone or in combination, teaches or suggests the invention set forth in claims 1 and 2. Therefore, it is believed that claims 1 and 2 are allowable over the cited references, and reconsideration of the rejections of claims 1 and 2 under 35 U.S.C. § 103(a) based on Furukawa, *et al.* and Behrens, *et al.*, is respectfully requested.

With regard to the rejection of claim 3 and the Chevalier, *et al.* reference, it is respectfully submitted that Chevalier, *et al.* is not applicable as a prior art reference against the present application. On its face, Chevalier, *et al.* appears to be possibly available as a prior art reference under 35 U.S.C. 103(a)/102(e).

However, with regard to the applicability of Chevalier, *et al.* as a prior art reference under 35 U.S.C. 103(a)/102(e), the present application was filed in the United States Patent and Trademark Office on December 15, 2003, and claims priority under 35 U.S.C. 119 to Korean Application Number 2002-80116, which was filed in the Korean Patent Office on December 16, 2002. The Chevalier, *et al.* reference was filed in the United States Patent and Trademark Office on September 25, 2003.

Applicant submits herewith an English-language translation of Korean Application Number 2002-80116, along with a statement by the translator that the "English translation is true and accurate" which is believed to perfect the priority claim of the present United States application to the Korean application. With the benefit of the perfected claim of priority to the Korean application under 35 U.S.C. 119, the present application has an effective date of December 16, 2002. Since the effective date of December 16, 2002 of the present application is earlier than the United States filing date of Chevalier, *et al.* (September 25, 2003), it follows that Chevalier, *et al.* is not available as a prior art reference under 35 U.S.C. 103(a)/102(e) against the present application.

Furthermore, Behrens, *et al.* discloses that a sampling device 24 samples an analog read signal 62 from an analog filter 20, and a discrete time equalizer filter 26 provides further equalization of the sample values 25 toward the desired response. A read channel is calibrated by writing a test pattern to a disc and, upon read-back, using a channel quality circuit 38 to compute sample errors as a function of current component settings. The test pattern is read several times with varying component parameters and a resulting mean squared error measurement is taken.

Behrens, *et al.* fails to teach or suggest an analog filter characteristic method which includes applying an impulse signal to an equalizing filter by using a digital channel of an automatic tester, and then obtaining an output response of the equalizing filter and performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test, as claimed in claim 3. In the present invention, applying an impulse signal to a DUT has the same meaning as simultaneously applying sine waves of all frequencies to the DUT. Behrens, *et al.* is applying sample signals to the discrete time equalizer filter 26, not an impulse signal. In addition, Behrens, *et al.* in no way teaches or suggests performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test.

Chevalier, *et al.* discloses computing coefficients of an equalizing filter of a channel by reverse FFT. Chevalier, *et al.* fails to teach or suggest an analog filter characteristic method which includes applying an impulse signal to an equalizing filter by using a digital channel of an automatic tester, and then obtaining an output response of the equalizing filter and performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test, as claimed in claim 3.

Behrens, *et al.* and Chevalier, *et al.* fail to teach or suggest elements of the invention set forth in claim 3. Specifically, Behrens, *et al.* and Chevalier, *et al.* fail to teach or suggest an analog filter characteristic method which includes applying an impulse signal to an equalizing filter by using a digital channel of an automatic tester, and then obtaining an output response of the equalizing filter and performing a differential and a fast Fourier transform (FFT) operation on the output response of the equalization filter so as to measure a boosting gain and a frequency response for testing an operation of the equalizing filter in at least one of a test procedure and a product test, as claimed in claim 3. Accordingly, there is no combination of the references which would provide such teaching or suggestion.

Chevalier, *et al.* is not available as a prior art reference. Furthermore, neither of the Chevalier, *et al.* and Behrens, *et al.* references, taken alone or in combination, teaches or suggests the invention set forth in claim 3. Therefore, it is believed that claim 3 is allowable over the cited references, and reconsideration of the rejections of claim 3 under 35 U.S.C. § 103(a) based on Behrens, *et al.* and Chevalier, *et al.*, is respectfully requested.

With regard to the rejections of claims 4 and 5 under 35 U.S.C. 103(a) based on the combination of Furukawa, *et al.* and Becker, *et al.*, Furukawa, *et al.* fails to teach or suggest a system for measuring a characteristic of a filter in a DUT employing an analog filter which includes a digital channel that provides an impulse signal without applying a sine wave to the analog filter of the DUT and a digitizer for receiving an output signal of the analog filter in response to the impulse signal so as to measure the characteristic of the filter, as claimed in claims 4-6. Instead, in Furukawa, *et al.*, the digital pins DPIN in no way provide an impulse signal to the low pass filter (LPF). In addition, an analog signal is applied to the LPFs through the analog pins APIN. In addition, in Furukawa, *et al.*, the digitizer 113 measures and analyzes frequency characteristics and group delays based on the analog signal output from the DUT 100. The analog signal output from the DUT 100 is output in response to the analog signal input to the analog pin APIN of the DUT 100, rather than the digital signal input through the digital pin DPIN.

Becker, *et al.* is cited in the Office Action as disclosing a controller 206 for controlling the digital channel 212 and the digitizer 220. Becker, *et al.* fails to teach or suggest a system for measuring a characteristic of a filter in a DUT employing an analog filter which includes a digital channel that provides an impulse signal without applying a sine wave to the analog filter of the DUT and a digitizer for receiving an output signal of the analog filter in response to the impulse signal so as to measure the characteristic of the filter, as claimed in claims 4-6.

Furukawa, *et al.* and Becker, *et al.* fail to teach or suggest elements of the invention set forth in claims 4-6. Specifically, Furukawa, *et al.* and Becker, *et al.* fail to teach or suggest a system for measuring a characteristic of a filter in a DUT employing an analog filter which includes a digital channel that provides an impulse signal without applying a sine wave to the analog filter of the DUT and a digitizer for receiving an output signal of the analog filter in response to the impulse signal so as to measure the

characteristic of the filter, as claimed in claims 4-6. Accordingly, there is no combination of the references which would provide such teaching or suggestion. Neither of the references, taken alone or in combination, teaches or suggests the invention set forth in claims 4-6. Therefore, it is believed that claims 4-6 are allowable over the cited references, and reconsideration of the rejections of claims 4 and 5 under 35 U.S.C. § 103(a) based on Furukawa, *et al.* and Becker, *et al.*, is respectfully requested.

With regard to the rejection of claim 6 under 35 U.S.C. 103(a) based on the combination of Furukawa, *et al.*, Becker, *et al.* and Behrens, *et al.*, Behrens, *et al.*, like Furukawa, *et al.* and Becker, *et al.*, fails to teach or suggest a system for measuring a characteristic of a filter in a DUT employing an analog filter which includes a digital channel that provides an impulse signal without applying a sine wave to the analog filter of the DUT and a digitizer for receiving an output signal of the analog filter in response to the impulse signal so as to measure the characteristic of the filter, as claimed in claims 4-6.

Furukawa, *et al.*, Becker, *et al.* and Behrens, *et al.* fail to teach or suggest elements of the invention set forth in claims 4-6. Accordingly, there is no combination of the references which would provide such teaching or suggestion. None of the references, taken alone or in combination, teaches or suggests the invention set forth in claims 4-6. Therefore, it is believed that claims 4-6 are allowable over the cited references, and reconsideration of the rejection of claim 6 under 35 U.S.C. § 103(a) based on Furukawa, *et al.*, Becker, *et al.* and Behrens, *et al.*, is respectfully requested.

In view of the amendments to the claims and the foregoing remarks, it is believed that all claims pending in the application are in condition for allowance, and such allowance is respectfully solicited. If a telephone conference will expedite prosecution of the application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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